Hardwood Structural Flakeboard—Development of the Industry in North America

Peter Koch and Norman C. Springate

ABSTRACT—After a faltering beginning in 1958, vigorous growth in the 1970s, and extraordinary expansion in 1980, 1981, and 1982, the structural flakeboard industry in North America is competing strongly with the softwood plywood industry in midwestern, eastern, and southern structural panel markets. In early 1982, existing and planned annual capacities in North America totaled about 1,186 million ft² in Canada and 1,733 million ft² in the United States (⅜-inch basis). Most mills use aspen, but two currently under construction will use hardwoods indigenous to Louisiana and east Texas.

Numerous laboratories in the world have experimented with fabrication of structural panels made from wafers (wide flakes) or strands (narrow flakes). In such panels, the flakes can be either randomly placed or oriented (*fig. 1*). Prominent in early efforts were J. d'A. Clark, who currently is a consultant in Bellingham, Washington, and A. L. Mottet, formerly research director of the Long-Bell Lumber Company, Longview, Washington. Both described waferboard products in papers presented during 1954 at meetings of the Forest Products Research Society. By 1958 a waferboard plant based on Clark's ideas was in operation at Sandpoint, Idaho. The board was manufactured primarily from western redcedar (*Thuja plicata*).

The introduction of a waferboard or structural flakeboard product in 1958, however, was not timely. North America had an abundant supply of low-cost peeler logs and therefore sheathing-grade plywood. As a result, the Sandpoint plant did not succeed in penetrating the market for structural sheathing-grade plywood.

In 1961, another waferboard plant was built in Hudson Bay, Saskatchewan. This venture also had marketing problems. It was eventually sold to MacMillan Bloedel, Ltd., and under this management waferboard found its way into the structural sheathing market in competition with West Coast plywood. Success was due mainly to its freight advantage.

The first markets for waferboard in the Canadian Prairies were in the construction and remodeling of farm buildings and fences, and as a general utility panel. In these applications, the product proved itself to be satisfactory as an exterior grade panel. Subsequently it received Canadian Code approval in the construction of homes and two-story apartment buildings.

In 1969, MacMillan Bloedel doubled its capacity at Hudson Bay. In the period from 1971 to 1979, four more waferboard plants were built in Canada and one particleboard plant was converted to waferboard, for a total Canadian annual capacity of 660 million ft², ⅜-inch basis.

By 1980 there were two waferboard plants in the United States, with total annual capacity of 200 million ft², ⅜-inch basis. In 1980 and 1981 three more plants started up in Canada and several in the United States. In early 1982, existing and planned annual capacities in North America totaled about 1,186 million ft² in Canada and 1,733 million ft² in the United States, ⅜-inch basis (*table 1* and *fig. 2*).

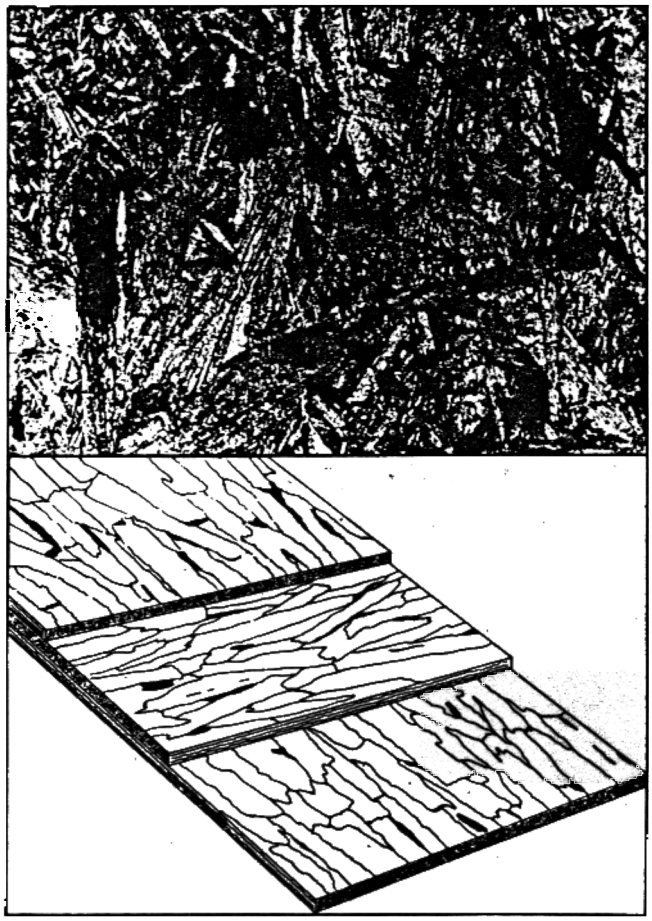

Figure 1. Structural hardwood flakeboards. (Top) *Three-layer waferboard with southern hardwood flakes randomly placed in each layer.* (Bottom) *Three-layer, oriented-strand board; flakes in the two face layers are aligned with grain parallel to the 8-ft edges of 4- by 8-ft panels, and those in the core at right angles to this.*

Through 1980 virtually all of the mills used only aspen (mostly *Populus tremuloides*). In 1981, one plant in New Brunswick, Canada, and another in New Hampshire in the United States were using some *Betula* and *Acer* species in mixture with less dense softwoods and aspen. Not listed in *table 1* or *figure 2* is the Georgia-Pacific Corporation's waferboard plant in Woodland, Maine; with annual capacity of 166 million ft², ⅜-inch basis, it uses softwoods only.

At the end of 1981, no plants were producing structural flakeboard from the mixtures of more-or-less dense hardwoods that typically grow among southern pines, despite the large potential for such production. In 1981 the Martin group of companies of Alexandria, Louisiana, began construction of such a plant in Le Moyen, Louisiana; it is scheduled for start-up in early 1983, with planned production capacity of 120 million ft² per

Table 1. Location, type, and annual capacity of existing and planned North American structural flakeboard plants using hardwoods, as of early 1982.[1,2]

Country and company	Location	Board type	Annual capacity (⅜-inch basis)
			Million sq. ft
CANADA			
Grant Waferboard[3]	Englehart, Ont.	Waferboard	150
Great Lakes Forest Products Ltd.[4]	Thunder Bay, Ont.	Waferboard	127
MacMillan Bloedel Industries Ltd.[4] (Thunder Bay Division)	Thunder Bay, Ont.	Waferboard	130
MacMillan Bloedel Industries Ltd.[4] (Hudson Bay Division)	Hudson Bay, Sask.	Waferboard	150
Malette Waferboard[4]	St. Georges-de-Champlain, P.Q.	Waferboard	130
Normick Perron, Inc.[4]	LaSarre, P.Q.	Waferboard	50
Northwood Pulp and Timber Ltd.[4]	Chatham, N.B.	Waferboard	150
Waferboard Corp. Ltd.[4]	Timmons, Ont.	Waferboard	69
Weldwood of Canada Ltd.[4]	Longlac, Ont.	Waferboard	110
Weldwood of Canada Ltd.[4]	Slave Lake, Alta.	Waferboard	120
UNITED STATES			
Blandin Wood Products Co. #1[4]	Grand Rapids, Minn.	Waferboard	90
Blandin Wood Products Co. #2[4]	Grand Rapids, Minn.	Waferboard	180
Diamond International Corp.[3]	Winn, Maine (or elsewhere)	Oriented-strand board	165
Elmendorf Board Corp.[4]	Claremont, N.H.	Oriented-strand board	100
Louisiana-Pacific Corp.[5]	Corrigan, Tex.	Oriented waferboard	125
Louisiana-Pacific Corp.[5]	Houlton, Maine	Oriented waferboard	130
Louisiana-Pacific Corp.[4]	Hayward, Wis.	Waferboard and oriented waferboard	128[6]
Martin group of companies[5]	Le Moyen, La.	Waferboard	120
Northwood Panelboard Co.[5]	Bemidji, Minn.	Waferboard	190
Potlatch Corp.[5]	Cook, Minn.	Oriented-strand board	155
Potlatch Corp.[4]	Midge Lake, Minn.	Oriented-strand board/ waferboard	155
Weyerhaeuser Co.[5]	Grayling, Mich.	Oriented-strand board	215

[1] Based on data from Forest Industries (1979, 1980), Hickson (1980), and correspondence with companies listed.
[2] See figure 2 for map of plant locations.
[3] In planning stage.
[4] In operation.
[5] Under construction.
[6] Capacity increased in 1982 to about 256 million ft², ⅜-inch basis.

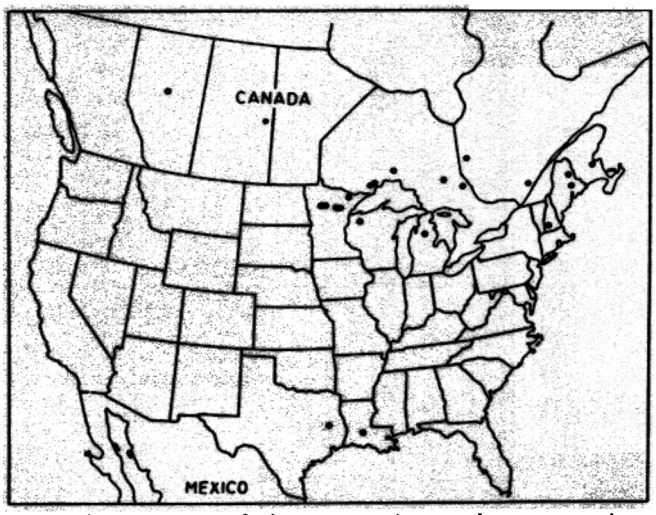

Figure 2. Locations of plants operating, under construction, or planned, for the manufacture of hardwood structural flakeboard, based on data available in early 1982.

year, ⅜-inch basis. Later in 1981, Louisiana-Pacific Corporation announced plans to produce hardwood flakeboard in Corrigan, Texas; annual capacity of this plant is projected at 125 million ft², ⅜-inch basis, with start-up also scheduled for 1983. Readers interested in fabrication procedures and properties of structural flakeboards made from southern hardwoods should consult chapter 24 of Koch (1983).

The rapid development of the North American structural flakeboard industry will result in intense competition with softwood sheathing-grade plywood for midwestern, eastern, and southern structural panel markets. Readers interested in analyses of the economics of flakeboard sheathing manufacture should read Koch (1978a,b,c,d, 1982), Harpole (1978, 1979), Vajda (1978), Dickerhoof and Marcin (1978), and Springate and Roubicek (1981).

Jorgensen (1978) described the history of requirements and codes related to structural flakeboard use in the United States. Standards applicable in the United States to structural flakeboard have been published by the National Particleboard Association (1980) and the American Plywood Association (1980). ■

Literature Cited

AMERICAN PLYWOOD ASSOCIATION. 1980. Performance standards and policies for APA structural-use panels. Am. Plyw. Assoc., Tacoma, Wash. 29 p.

DICKERHOOF, H. E., and T. C. MARCIN. 1978. Factors influencing market potential for structural flakeboard. P. 3–10 *in* Structural Flakeboard from Forest Residues. Proc. symp., Kansas City, Mo., June 6–8. USDA For. Serv. Gen. Tech. Rep. WO-5.

FOREST INDUSTRIES. 1979. Waferboard boom: plant capacity will more than double. For. Ind. 106(7):11, 13.

FOREST INDUSTRIES. 1980. Three board plants head building list. For. Ind. 107(15):15.

HARPOLE, G. B. 1978. Overview of structural flakeboard production costs. P. 140–149 *in* Structural Flakeboard from Forest Residues. Proc. symp., Kansas City, Mo., June 6–8. USDA For. Serv. Gen. Tech. Rep. WO-5.

HARPOLE, G. B. 1979. Economic models for structural flakeboard production. For. Prod. J. 29(12):26–28.

HICKSON, C. H. 1980. Waferboard, structural particleboard, and their adhesives. Paper presented at 34th Annu. Meet., For. Prod. Res. Soc., Boston, Mass. July 6–10. 13 p.

JORGENSEN, R. N. 1978. Requirements, codes, and Forest Service goals. P. 10–12 *in* Structural Flakeboard from Forest Residues. Proc. symp., Kansas City, Mo., June 6–8. USDA For. Serv. Gen. Tech. Rep. WO-5.

KOCH, P. 1978a. Five new machines and six products can triple commodity recovery from southern forests. J. For. 76:767–772.

KOCH, P. 1978b. Production opportunities in four southern locations. P. 150–165 *in* Structural Flakeboard from Forest Residues. Proc. symp., Kansas City, Mo., June 6–8. USDA For. Serv. Gen. Tech. Rep. WO-5.

KOCH, P. 1978c. Shaping-lathe headrig can profitably yield short cants or flitches and structural flakeboard panels from small-diameter hardwoods. Pap. FID-II/21-2 presented at Eighth World For. Congr., Jakarta, Indonesia, Oct. 16–28. 23 p.

KOCH, P. 1978d. Two methods of acquiring residual wood for southern flakeboard plants: the shaping-lathe headrig and the mobile chipper. P. 39–46 *in* Structural Flakeboard from Forest Residues. Proc. symp., Kansas City, Mo., June 6–8. USDA For. Serv. Gen. Tech. Rep. WO-5.

KOCH, P. 1982. Non-pulp utilization of aboveground biomass of mixed-species forests of small trees. Wood and Fiber 14:118-143.

KOCH, P. 1983. Utilization of hardwoods growing on southern pine sites. USDA For. Serv. Agric. Handb. [in press], 3 vol. U.S. Gov. Print. Off., Wash., D.C.

NATIONAL PARTICLEBOARD ASSOCIATION. 1980. Revised standard for mat-forming particleboard. Natl. Particleboard Assoc., Wash., D.C.

SPRINGATE, N. C., and T. T. ROUBICEK. 1981. Economic feasibility of reconstructed panel production from southern hardwoods compared to production of southern pine composite boards or plywood. P. 176–182 *in* Proc. symp., Utilization of Low-grade Southern Hardwoods—Feasibility Studies of 36 Enterprises. D. A. Stumbo, ed. Nashville, Tenn., Oct. 1980. For. Prod. Res. Soc., Madison, Wis.

VAJDA, P. 1978. Plant facility considerations for structural flakeboard manufacture. P. 133–140 *in* Structural Flakeboard from Forest Residues. Proc. symp., Kansas City, Mo., June 6–8. USDA For. Serv. Gen. Tech. Rep. WO-5.

THE AUTHORS—Peter Koch is leader, Special Project, Utilization of Lodgepole Pine in North America, USDA Forest Service, Intermountain Forest and Range Experiment Station, Missoula, Montana 59806. He was formerly chief wood scientist, Southern Forest Experiment Station, Pineville, Louisiana. Norman C. Springate, who supplied the historical perspective of development of the Canadian industry, was president of Norman Springate and Associates, Inc., Vancouver, British Columbia. He died following an automobile accident in September 1982.

March 1983/Volume 81/Number 3

JOURNAL OF FORESTRY

A publication of the Society of American Foresters devoted to advancing the science, technology, practice, and teaching of professional forestry

Of special interest: TV IMAGE-MAKING—*Waltons' Dad Shoots Forester Spots*, p. 144–45.

ARTICLES

REPORT

WORLD FORESTRY

DEPARTMENTS

Cover: Ralph Waite, of the CBS series "The Waltons," stars in new SAF public service messages. Photo by David L. Simpson; story by Philip V. Petersen, page 144.

Journal Staff N. H. Sand, *editor*, Wendy B. Osborne, *production editor*, Jay Heinrichs, *associate editor*, Margaret Rees Oliu, *assistant editor*, Karl F. Wenger, *editorial consultant*, W. Eric Casey, *advertising manager*.

Editorial Board Douglas C. Allen, Robert L. Bailey, William R. Beaufait, Sally K. Fairfax, Gene W. Grey, James W. Hornbeck, Von J. Johnson, Allen L. Lundgren, Harold E. Matics, Jack Ward Thomas, Ben W. Twight

PERMISSION TO REPRINT.—Individual readers of this journal and nonprofit libraries acting for them are permitted to make fair use of the material in it, e.g., copying an article for use in teaching or research. Permission is granted to quote from this journal with the customary acknowledgment of the source. To reprint a figure, table, or other excerpt requires in addition the consent of one of the authors and notification of the Society of American Foresters. Republication or systematic or multiple reproduction of all copyrighted material in this journal (including abstracts) is permitted only under license from SAF. In addition, the copyright law requires that permission also be obtained from one of the authors.

Published monthly by the Society of American Foresters, 5400 Grosvenor Lane, Bethesda, Md. 20814. Phone (301) 897-8720. ©Copyright 1983 by Society of American Foresters. ISSN 0022-1201. Address correspondence to *Journal of Forestry*. Subscription rates are $38 per year postpaid for institutions in the U.S. ($42 for institutions in foreign countries) and $30 for individuals in the U.S. ($34 for individuals in foreign countries). Subscriptions must be entered on a calendar-year basis, January 1 to December 31. No subscriptions will be accepted for less than a 12-month period, but a subscription may be started in any month after January, provided it also covers the following calendar year. Payment for new subscriptions must be received at least 30 days prior to the date of the first issue to be covered thereby. Missing issues covered by paid subscription will be replaced without charge provided claim is made within 60 days after the following issue for addresses in the U.S. and Canada; elsewhere, within six months. Otherwise, payment at single issue price ($3) will be required. Direct all correspondence relating to manuscripts to N.H. Sand. Manuscripts and illustrations will be handled with care, but the publisher cannot assume responsibility for their safety. Opinions expressed by authors are their own and do not necessarily reflect the policy of the Society of American Foresters. Second-class postage paid at Washington, D.C., and at additional mailing offices. Send address changes to Address Change Department, Society of American Foresters, 5400 Grosvenor Lane, Bethesda, Md. 20814.